IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
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N05/5/COMSC/HP1/ENG/TZ0/XX

88057011

COMPUTER SCIENCE
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PAPER 1

Friday 4 November 2005 (afternoon)

2 hours

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Section A: answer all the questions.
- Section B: answer four questions.

SECTION A

*Answer **all** the questions.*

1. (a) State **two** differences between CD ROM and a *hard disk*. *[2 marks]*

(b) State **two** appropriate uses for CD ROM. *[2 marks]*

2. Outline **one** reason that software development is normally cyclical. *[2 marks]*

3. Outline what is meant by *the scope of identifiers*. *[2 marks]*

4. Describe the function of a *linker*. *[2 marks]*

5. Describe how a *bubble sort* works. *[3 marks]*

6. Describe with aid of diagrams the data structure called *a doubly linked list*. *[3 marks]*

7. One of the *systems analyst's* tasks is to find facts about the current *computer system*. State **two** ways of collecting data about the current system. *[2 marks]*

8. (a) Define CPU. *[2 marks]*

(b) Outline what is meant by the term *word size* of a computer. *[2 marks]*

9. Outline the representation of the following values in an 8-bit register in *two's complement* form.

(a) $+23_{10}$ *[1 mark]*

(b) -23_{10} *[1 mark]*

10. Define *polling*. *[2 marks]*

11. Explain the purpose of a *protocol* in data transmission across a network. *[2 marks]*

12. Define the Boolean **XOR** operator by drawing the appropriate truth table. *[3 marks]*

13. Outline **one** application of *digital cameras* in computing. *[2 marks]*

14. Outline the function of a *modem.* *[2 marks]*

15. Given the following *infix expression* 5 **div** 2 + 7 **mod** 3:

(a) Evaluate this expression. *[1 mark]*

(b) Convert this expression into *postfix (RPN) form*. *[2 marks]*

(c) Draw *the binary tree* representing this expression. *[2 marks]*

SECTION B

*Answer **four** questions.*

16. An organization established a single computer department to supply data processing services to all other departments. This centralized approach proved unsatisfactory and was replaced by *distributed processing*. In this system each department uses a separate computer facility to service its needs. Users have their own computer equipment and all computers are *networked*.

(a) Suggest **three** reasons why the centralized approach might have proved unsatisfactory. *[3 marks]*

(b) Discuss **two** benefits to users (employees, computer specialists, and management, *etc*.) from the distributed processing approach. *[4 marks]*

(c) State **three** measures to maintain the *integrity* and *security* of data in this system. *[3 marks]*

17. (a) Define *file*. *[2 marks]*

(b) Identify **two** factors to be considered when deciding which type of *file organization* is appropriate. *[2 marks]*

(c) A file is to be stored on a *direct access device*.

(i) State **two** methods by which the file on the *direct access device* may be organized. *[2 marks]*

(ii) For **one** of the methods explain how a *record* in a file can be modified. *[4 marks]*

18. (a) Explain the main characteristics of

(i) *batch processing*. *[2 marks]*

(ii) *real time processing*. *[2 marks]*

(b) Identify the type of processing method that could be used

(i) to control the position of a space shuttle. *[1 mark]*

(ii) for payroll processing. *[1 mark]*

(c) Describe **one** advantage of using a *multitasking operating system* on a *single user system*. *[2 marks]*

(d) Outline the difference between methods used to input data for *batch processing* and those used for i*nteractive* processing. *[2 marks]*

19. (a) Define *queue*. *[2 marks]*

(b) Queues can be implemented either by *arrays* or *linked lists*.

(i) Outline **one** problem that is likely to occur when an *array* is used to represent a *queue*. *[2 marks]*

(ii) Explain the steps needed to add a node to the *queue* implemented by *linked list*. *[3 marks]*

(c) (i) Explain what is meant by a *circular linked list*. *[2 marks]*

(ii) Identify **one** reason to use a *circular linked list* to implement the queue rather than a *non-circular linked list*. *[1 mark]*

20. The array NAMES holds the following values.

Ana	Ena	Eva	Mia	Tea	Pia
[1]	[2]	[3]	[4]	[5]	[6]

In the following algorithm SWAP is a procedure that interchanges the values of two string variables.

```
procedure MYSTERY(val B1 integer,
                  val B2 integer,
                  ref NAMES string array [1..6])

   if B1 < B2
          then  SWAP ( NAMES [B1], NAMES [B2])
                MYSTERY( B1+1, B2-1, NAMES)
   endif
  endprocedure MYSTERY
```

(a) (i) Trace the algorithm for the call MYSTERY(1, 6, NAMES). *[4 marks]*

(ii) Deduce the purpose of the algorithm. *[2 marks]*

(b) (i) Outline what is meant by *parameter passing*. *[2 marks]*

(ii) Outline **one** advantage of using *parameter passing*. *[2 marks]*